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Combat Crew

strategic air command

★★★★ JANUARY 1976

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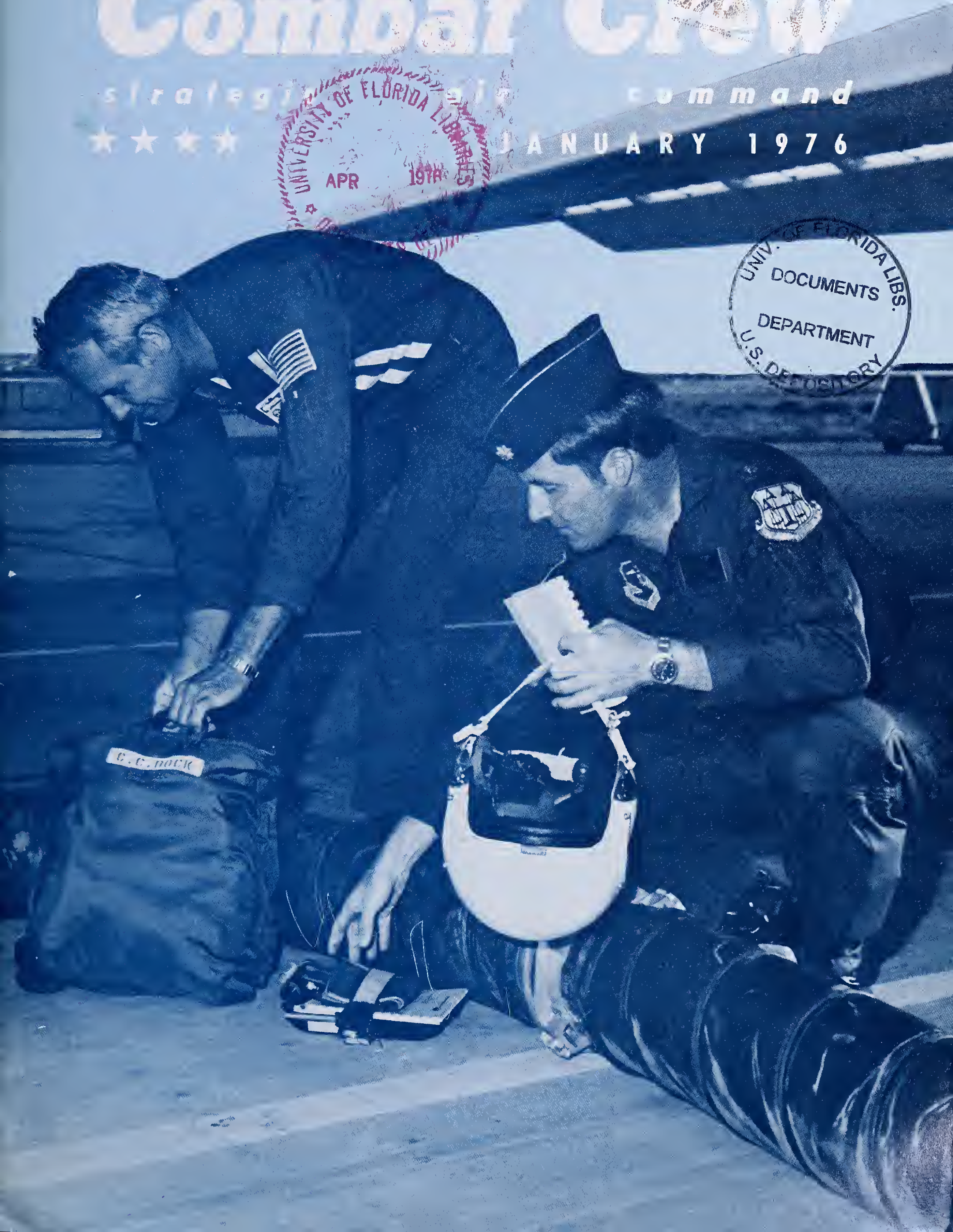

Combat Crew

strategic air command

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ON OUR COVER

SAC Test Pilot Major George Larson, the first SAC pilot to fly the B-1, and Rockwell International Chief Test Pilot Charlie Bock prepare for flight. See page 4.

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IT WON'T JUST HAPPEN

GENERAL RUSSELL E. DOUGHERTY
Commander-in-Chief, SAC

If you have ever crossed your fingers, worn a charm bracelet, carried a rabbit's foot in your pocket, or pressed a four leaf clover in your wallet, then you may have some idea how many senior SAC officers felt during the last four months of 1975. Our apprehension was due in large measure to the knowledge that we were close to having the lowest major accident rate in the history of the Command—yet with its youngest, most inexperienced flyers.

The best accident rate is "zero,"—as we all know—because that means that no lives have been lost, or equipment destroyed, or property damaged needlessly. But we also know that we could be sure of such a perfect rate only by doing nothing at all—coming to a complete standstill—but we can only support our mission of deterrence by continual demonstration of our ability to fight wars successfully. As John Shedd has written, "A ship in the harbor is safe, but that is not what ships are built for."

We did not achieve that lowest major accident rate, but 1975 was one of the lowest in this regard. A rate of approximately .96 major aircraft accidents per 100,000 flying hours is one of which we can all be proud any year. But, in the context of our present environment, it borders on the incredible. A brief comparison will demonstrate what I mean. In 1957, the average B-52 aircraft commander was just over 35 years of age, and had accumulated more than 4,000 flying hours. The SAC major accident rate for that year was 5.26 per 100,000 flying hours. Today this mythical average B-52 aircraft commander is some five years younger and has less than 2,500 total flying hours (his navigator has less than 700 total hours)—yet the major accident rate is five and one-half times as low.

We are being pressed from all sides by a confluence of circumstances which have made for lowered crew experience, and less training opportunities which conventional wisdom tells us will mean more accidents. These include: younger crewmembers, less flying time per crewmember, older aircraft (some B-52 crewmembers are barely older than the D models they fly), more diverse and complex missions, and a continual pressure to maintain the same proficiency levels with less flying time.

Yet, despite these factors, the SAC flying teams—and they include all who participate in the missions—have at least temporarily refuted the conventional wisdom and have turned in an exceptional safety record. The obvious following question to these results is: "Why?" How is it that this generation of flyers can do "more with less" than the last generation did . . . and do it with exceptional attention to safe, reliable operations? One answer to this question was provided me by a young pilot. He said: "We are smart enough to read and heed the Warning and Caution notes in the flight manuals without have to crash and die to prove that they are right."

I am certain that there is some truth in this explanation. A group with higher levels of education and vastly improved intercommunication—as this generation unquestionably has over those which have gone before—is more inclined to accent the distillate of wisdom from experienced flyers, which the flight manual represents, than is one whose education has been to a greater extent practical and personal. Certainly, better training and evaluation by instructors, supervisors and commanders—who also are better educated—must also weigh heavily in the equation. Yet, taking advantage of superior education can't be the entire answer. The accidents and incidents

(Continued on Page 14)

FIRST . . . . . .

Editor's note: Recently the B-1 completed its 24th mission. During the five-hour and 46 minute flight, the aircraft reached an altitude of FL 500 and a speed of 1.6 Mach. The total supersonic time was approximately 45 minutes. Mission objectives included the evaluation of flight qualities, terrain following, and a test of the pitch exciter.

IMPRESSIONS

MAJOR GEORGE W. LARSON
Test Pilot, 4200 T&E Sq Edwards AFB

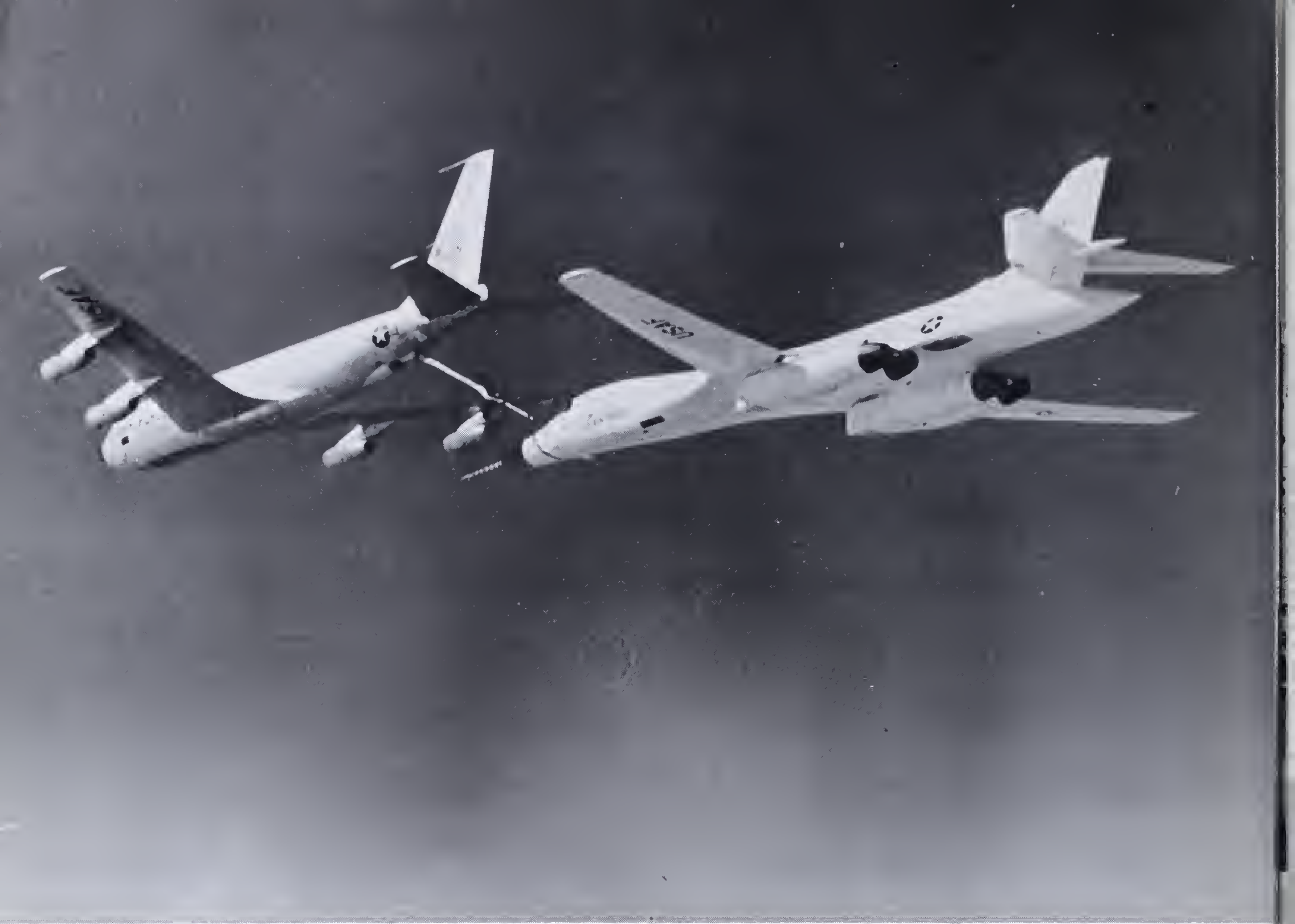
On 19 September 1975, the B-1 made its most successful and longest flight to date. It was my privilege to represent both SAC and AFTEC as a crew member on that flight. During the flight, I occupied the copilot station with the Rockwell International chief test pilot in the left seat and a Rockwell International flight test engineer in the rear station—there are no offensive avionics on board the first aircraft that require a systems operator.

The specific objective of this flight was to determine flying qualities and handling characteristics when flown manually during such phases as aerial refueling, high speed at both high and low altitude, and approach and landing. Of the total 6 hours and 35 minute duration of this flight, the controls were mine for approximately one-third of the time.

Preparation for the flight spans a period of at least a year and a half. Ground training was accomplished through attendance in many design reviews while the aircraft was in the process of fabrication and assembly. In addition, approximately 140 hours have been spent in the B-1 six degree of freedom simulator and other simulators representing predictions of the B-1 flight characteristics. Several flights in F-111 series aircraft were made because of the F-111's similar configuration characteristics. A brief one week contractor systems familiarization course was also completed. Cockpit time was obtained during the time that subsystem checks and engine runs were made as preflight checks. During the few days preceding the flight, time was spent attending briefings to define and decide upon test points to be accomplished, flying the mission phases in the B-1 simulator, and completion of necessary prerequisites such as exams and a flight physical.

On the morning of the flight, station time was three hours prior to takeoff. While this time appears excessive, a large portion of it is devoted to onboard systems checks essential to a flight test mission. I don't envision the operational station time to be any longer than the current time for FB-111 or B-52 training missions.

Major Larson and Rockwell International Flight Test Engineer Richard Abrams board the B-1.



"Only very small throttle and flight control movements were required to maintain a stabilized refueling position."

Upon climbing on board the B-1, there are some obvious impressive features. The pilot stations induce a fish bowl effect due to the large amount of glass which provides excellent visibility outside the cockpit. There is ample room to leave your seat and stretch during long missions. The primary flight and engine instruments are laid out to provide favorable visual interpretation from either pilot station. All primary and secondary flight controls, with the exception of the gear and flap handles (which belong to the copilot) are duplicated at each pilot station. Pilot and copilot flight instruments are identical and completely independent of each other. Each pilot has his own set of four throttles, which fit very nicely in any size hand. The engine instruments are of the tape type and require some initial adaptation. There is no EPR instrument. Instead there is a power level tape instrument which combines EPR with engine nozzle position to give power indications from idle to full augmented thrust. There are two RPM tape instruments per engine, one for fan RPM and the other for core RPM. Engines are not shut down with the throttles. That function is provided by stop/start switches which preclude inadvertent engine cutoff. The fuel system display not only gives tape and digital readings in all tanks, but also provides total fuel flow and quantity, gross weight, center of gravity limits for the particular aircraft configuration, actual center of gravity and commanded center of gravity. Best of all it is totally automatic with a manual backup capability.

The checklists to be accomplished prior to takeoff are constructed logically and permit optimum crew coordination. I am sure that the checklist now in use will be changed a great deal and grow extensively, but should retain optimal crew coordination.

As the copilot I did not make the takeoff, but did observe that no more than a slight positive rotation was required. The subsequent acceleration and climb to cruise altitude was effortless. Changing the angle of wing sweep for the climb, or other phases, requires a change in aircraft center of gravity to remain within center of gravity limits. On the B-1 this required change was performed automatically and displayed in the cockpit by the fuel and center of gravity management system and all the copilot need do is periodically monitor the display. This, the 17th flight, was flown in a test sequence as follows:

1) Takeoff

2) Climb at intermediate thrust (military) to 20,000 ft.

3) Cruise from Edwards AFB to the Pacific Missile Range at Mach numbers from 0.80 to 0.90.

4) Descent to 5000 ft to conduct flying qualities tests at 0.80 and 0.85 Mach numbers. These tests consist of making controlled inputs to the pitch, roll, and yaw axis of the flight control system with the stability and control augmentation system both on and off to determine aircraft and flight control characteristics.

5) Climb to 24,000 ft for an acceleration from 0.80 Mach to 1.25 Mach.

6) Climb to 30,000 ft for continued acceleration from 1.25 to 1.4 Mach.

7) Descent to 20,000 ft and decelerate to 0.70 for air refueling.

8) Descent to 2500 ft for flying qualities test at 0.80 Mach.

9) Descent to 500 ft for flying qualities test at 0.75 and 0.80 Mach.

10) Climb to 10,000 ft for a flying qualities evaluation of the roll/yaw interconnect. This test, done at 180 kts with gear, flaps, and slats extended, was accomplished to determine the effectiveness of the roll/yaw interconnect in reducing the adverse yaw noted on earlier flights during roll inputs at low speed.

11) Climb to 21,000 ft for return cruise to Edwards AFB.

12) Descent to 5000 ft for low approach at Edwards AFB, and continued evaluation of the roll/yaw interconnect in the traffic pattern.

13) Landing.

The B-1 at high speeds (high or low altitudes) is, as might be imagined, more responsive in pitch and roll than at low speeds (i.e. the traffic pattern). The roll control is accomplished by a full rolling tail augmented by spoilers, while pitch control is affected by commanding move-

(Continued on page 22)

For takeoff, "no more than slight positive rotation was required."

THEY CAME TO CARSWELL TO REVIEW . . .

THE CHALLENGE OF SAFETY

MAJOR RICHARD W. BLATTER
Editor

From as far away as Andersen and Kadena, safety professionals gathered at Carswell to attend the 1975 SAC Safety Seminar. The purpose of the seminar was to discuss problems, exchange ideas, and to find solutions to existing problems in safety. More than 170 seminar attendees represented over 40 bases and operating locations. The National Guard Bureau, Directorate of Nuclear Safety and the Air Force Inspection and Safety Center were represented in addition to HQ SAC, NAF and SAC operational units. For the fifth time in the last six years, the host organization for the SAC Safety Seminar was the Operations Training Support Laboratory (OTSL) at Carswell. The seminar included four days of an intensive schedule of seminars, lectures, presentations, and cross-talk sessions.

Col Jesse S. Hocker, the SAC Director of Safety, presented the keynote address, and set

the tone of the seminar. He pointed out current successes in several areas of the SAC Safety Program, and addressed some of the safety problem areas that face the command. He emphasized that one of the goals of the seminar is to exchange information and develop new and innovative approaches. Attendees were challenged to produce results that will reduce our accident rates even more than they have been reduced in the past. Col Hocker pointed out that we have the obligation to comply with the requirements of the Occupational Safety and Health Act of 1970 and he stressed the importance of placing OSHA deficiency correction on the functional manager.

During the four days at Carswell, seminars were conducted by SAC and NAF staffs. The sessions were oriented to the areas of flying, missile, ground, and nuclear safety. The primary concern in each seminar session was to achieve a rapid and meaningful flow of communication between the conferees and staff personnel on problems peculiar to the various safety disciplines.

One highlight of the seminar was an address by the principal guest speaker, Brigadier General Richard E. Merkling, Director of Aerospace Safety for the Air Force Inspection and Safety Center (AFISC), Norton AFB, CA. In his address, Gen Merkling made the point that a safety man is only as effective and efficient as his commander's support of the safety program. If the commander is not behind safety and accident prevention, we will have a hard time doing a good job.

On the subject of safety manning, Gen Merkling pointed out that in 1966 the Air Force had 2832 personnel assigned in the safety field and today we have 2470. While we have reduced the total Air Force strength by 28%, we have reduced the safety segment by only 12%. This is a reflection of the emphasis that has been placed on reducing the costly loss of life and expensive weapon systems. Today we need a good balance between the technical specialist and the safety professional. We can do ourselves a disservice if we get out of balance in either area.

On accident prevention history, it was pointed out that in 1943 the Air Corps had 20,000 major aircraft accidents in the CONUS with 5,600 fatalities. The rate per 100,000 flying hours was 64.

As we progressed into the sixties we looked to standardization as a means to more effectively accomplish our mission. We found that increased safety was a fallout of our strong standardization program.

Seminar sessions were oriented to the areas of flying, missile, ground, and nuclear safety.

In 1973, we achieved our absolute lowest aircraft accident rate of 2.3. What we are looking for today is a way to define and identify a new approach to safety that will allow us to improve our performance on the lower end of the accident rate curve.

In the past, we have taken *after the fact* corrective action. We tend to be oriented toward not doing something about a problem, or not recognizing a problem, until we have had an accident. Today, and in the future, we must analyze, identify and take corrective action on factors before they result in the loss of life or the loss of valuable equipment. We must be effective *before the fact.*

In order to identify before the fact accident factors, AFISC has formed Action Teams composed of representatives of all the disciplines associated with safety. The action team is primarily concerned with systems in developmental stages. Today, for example, the B-1 action team is extremely active. The action team puts together information that is available from the Safety Center, the contractor, the developing, supporting, and the using commands. Action teams are concerned with preventing potential accident factors from forming. They complete four important steps:

- Collect/Analyze data
- Define root causes
- Validate root causes
- Determine a decision path for accident prevention

One of the goals of this program is to come up with a priority list, by aircraft and mod of the corrections that should be made to our weapon systems—*before the fact.*

Speaking of the Occupational Safety and Health Act of 1970, Gen Merkling told the seminar attendees that the Air Force is integrating the OSHA requirements into the standard Air Force occupational, industrial and health programs. What we are doing is taking the requirements of OSHA and putting them into a consolidated directive. This directive will place the responsibility for correcting OSHA deficiencies on the functional manager. It will require that deficiencies be reported to the base commander and up channel to the major command.

Seminar attendees were fortunate to hear a crash survival lecture by Brigadier General William W. Spruance, Hq Delaware Air National Guard. Gen Spruance presented a vivid description of his survival after a near fatal T-33 crash in 1961. Gen Spruance made several strong points on preparation for pre-crash, crash and post-crash survival. Not only were his remarks addressed to the occupants of aircraft, but they were also addressed to occupants of automobiles and other vehicles. A detailed recap of his presentation appears in the *Will to Live* article in this issue of *Combat Crew*.

The luncheon meeting, which was held on Thursday, featured as guest speaker Col Geroge F. Bennett, USAF Ret. Col Bennett's Air Force safety assignments included Wing Director of Safety and from 1968 to 1969 he was the Director of Safety in Vietnam. He was also the Chief of Missile Safety and Chief of Flying Safety at NAF level and the Deputy Director of Safety at Hq SAC.

Principal guest speaker, Brigadier General Richard E. Merkling.

Col Bennett pointed out that one of the major problems that we have in the safety field is that we repeat the same mistakes. Today we have the capability to make very accurate predictions. We can predict how many accidents we will have on a given weekend. We can also predict the type of person who will have the most accidents and usually under what conditions. And yet we allow the predictions to come true. How do we get the right word to the right people prior to the event with enough force to eliminate or drastically reduce our accident rates? Taking decisive action on information that we already know, is one of the major challenges in all areas of safety today. Colonel Bennett emphasized that "safety people must be inquisitive. They must continually ask questions. How can I produce a better program? How can I better motivate management, supervisors, and the people doing the work?"

The 1975 SAC Safety Seminar was a complete success. With strong participation from all units, the safety professionals who attended had the opportunity to receive a great deal of safety oriented material as well as the opportunity to contribute to productive seminar and cross-talk sessions. All in all, it was a **Good Show!**

BIG INSTRUMENT

PRECISION FINAL APPROACHES

CAPTAIN THERON L. SIMS
1st CEVG, Barksdale AFB

"The men you are teaching today are going to be the backbone of the all-weather Air Force tomorrow. They've got to be good. They've got to learn precision flying so thoroughly that it becomes automatic. Grade A, Superior (rating), results when variation from the desired condition of flight does not exceed 20 feet of altitude, 2 mph of airspeed, and 2° of direction." This is a statement from a 1950 vintage instrument flying instructor manual. This statement, which was applied to the early jet inventory of past years, holds true for all SAC crewmembers today. Due to present instrument displays, those demanding instrument tolerances of the 1950s can be attained in today's jet forces. To most pilots, the precision approach offers the greatest challenge in demonstrating a superior instrument crosscheck and skill at the controls. This article will address basic instrument techniques and how their understanding can relate to precision approaches. Only the final approach segment will be discussed and although specifically referenced to radar, the same techniques can be applied to ILS approaches.

The precision final approach starts when the aircraft is within range of the precision radar and contact is established with the final controller (normally eight miles from touchdown). From start descent to decision height is the bread and butter maneuver phase for pilots and several preparatory steps in the airborne planning stages should be considered. Knowing what to look for

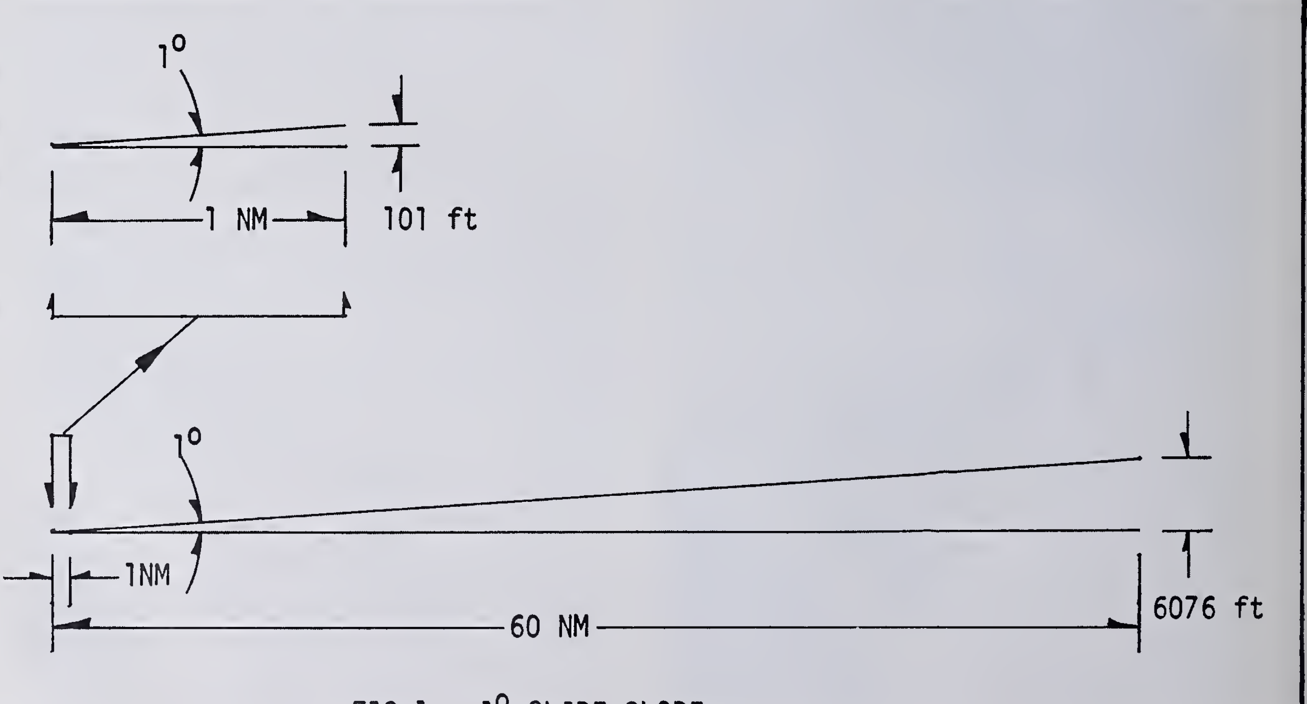


FIG 1 - 1° GLIDE SLOPE

during that initial PAR descent can make the difference between safely landing or being sent around.

AFM 51-37 requires a review of approach minimums, lost communication instructions when practical, final approach airspeed, and the approximate target descent rate required on final approach. This last item, descent rate, is a direct result of your aircraft pitch change.

What is the amount of pitch change required at the initial descent point for a 2.5° or 3° glide slope? The pitch change from your last known level flight condition should be equal to the glide slope angle, e.g., 2.5° of nose low pitch change required for a 2.5° glide slope. Remember, from basic instrument flying that pitch attitude control is used to maintain the desired vertical velocity, while power control is used to maintain the desired airspeed. Understanding the relationship between pitch in degrees and your descent gradient is one of the keys to precision flying. On a 2.5° glide slope the aircraft will descent 250 feet per nautical mile. Figure 1 shows the mathematical degree relationship between 1 NM and 60 NM in feet. One degree at 60 NM from a common point equals approximately 6000 feet; while one degree at 1 NM equals approximately 100 feet; therefor a 3° glide slope equals 300 feet per mile descent gradient. (See Figure 2) This discussion supports the question asked at the beginning of this paragraph and leads into methods to compute vertical velocity.

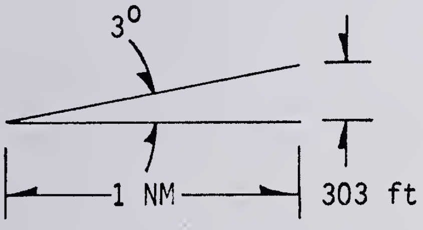


FIG 2 - 3° GLIDE SLOPE

Since vertical velocity is used to crosscheck pitch control, several techniques are listed below to determine the initial descent rate required during the final approach. Whichever method you select will give a target descent rate to be used initially.

(1) Rate of Descent Table (ft per min), page VIII, of every High Altitude Instrument Approach Procedure book depicts ground speed and angle of descent to provide exact mathematical rates of descent.

(2) For a 3° glide slope, divide ground speed by two and add a zero, (e.g., 140 Kts x 10 - 700 fpm) Subtract 100 fpm from answer to arrive at a 2.5° glide slope rate of descent.

(3) Divide indicated airspeed (IAS) corrected for wind by two and add a zero.

e.g., 3° glide slope-corrected for wind.

(a) with 10 Kts Headwind

$$\frac{130\ \text{KIAS} -}{2}\ 10 \times 10 = 600\ \text{fpm}$$

(b) with 10 Kts Tailwind

$$\frac{130\ \text{KIAS}}{2} + 10 \times 10 = 700\ \text{fpm}$$

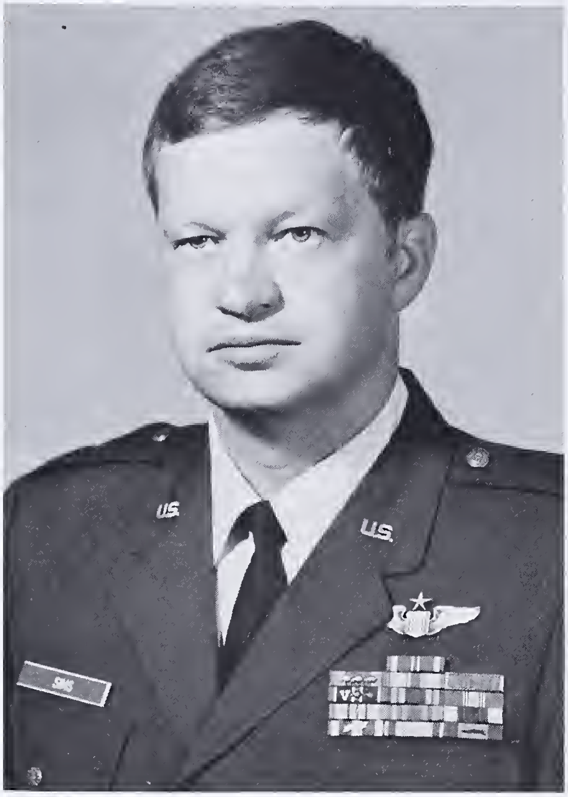
Subtract 100 fpm from answer to arrive at a 2.5° glide slope rate of descent. These three suggested methods replace the age old "TLAR" ("That Looks About Right") approach to descent rates.

After established in the descent, a series of corrections invariably are required to maintain "on course, on glide path." Shoot for perfection but realize many variables are present on every precision approach. Your flying technique and the controllers actions on a PAR approach are the main variables. The effect of a strong wind gradient and its effect on descent rates should also be mentally considered. Pitch adjustment in small increments will usually result in more precise glide path control. Pitch corrections of 200 - 300 fpm (one degree at approach speeds) or less are normally sufficient. The above examples show how a 3° pitch change will result in 700 fpm of vertical velocity for a 3° glide slope. One-half miniature aircraft dot (or half a bar width) correction or 1° change in pitch does require concentration and practice in refining precision instrument approach techniques. The amount of deviation from the desired performance will always determine the magnitude of the correction required.

Knowing the correct pitch change and the resulting approximate vertical velocity will make flying a PAR approach both easier and more enjoyable. The goal of every instrument approach is to make a safe consistent landing out of the maneuver. Most good landings are really a result of how well that last eight miles are flown.

BIG INSTRUMENT . . .

Let's make 1976 a zero defect year for the precision approach by working toward flying within "20 feet, 2 mph, and 2° direction" as those pilots did who attained superior ratings in the 1950s. Fly safe and have a super bicentennial year.



ABOUT THE AUTHOR

As the Deputy Chief, SAC Instrument Division, Captain Theron L. "Buddy" Sims develops, monitors, and analyzes the effectiveness of the SAC instrument training program. He assists in maintaining the SAC instrument refresher course (AIRC) and the SAC instrument exam. He is a native of Topeka, Kansas, where he graduated from Washburn University in 1967. Upon receiving his commission from the two-year ROTC program, he entered UPT at Vance AFB. A senior instructor/evaluator pilot qualified in all B-52 weapon systems, he has over 3000 flying hours, which include 1300 in SEA. He is a graduate of the USAF Instrument Pilot Instructor School (IPIS) and has earned a Masters Degree in Personnel Management from Central Michigan University.

IT WON'T JUST HAPPEN . . .

(Continued from page 3)

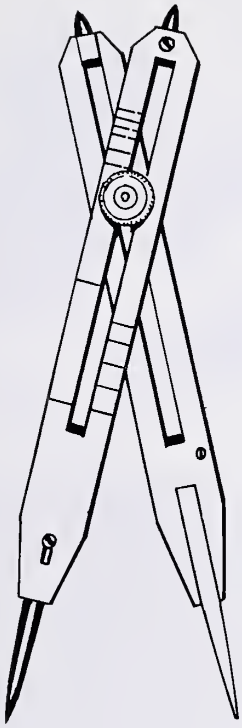
involving these same flyers for 1975 reflects an increase in human error.

Our missile mishaps—though lower than 1974—must be considered on the basis of lessened drone activity, removal of the Hound Dog from the inventory, and increases in the percentage of those accidents caused by human error.

And . . . while we do well with our major weapon systems—our 1975 ground accidents are way up! The Air Force motor vehicle accident rate for the Command has become a simply tragic figure. The majority of our ground accidents appear to be the direct result of individuals failing to comply with established standards or to employ common sense in daily activities. It is a paradox that these deficiencies are also chargeable to people with the same relative "better education" that we consider so favorably with regard to our weapon system accident rates!

Since SAC's "ships" cannot "stay in harbor," there is a lesson to be learned from 1975. What we need to do is discover the casual factors in our weapon systems' safety successes and apply this discovery to **all** our operations. I don't think our people are going to get any younger—but they will continue to be young and short on experience for some time—and we can expect that it will continue to be difficult, if not impossible, to support the rigorous and extensive equipment training we have enjoyed in prior years.

As a crewmember, staff officer, and commander—across the three decades of SAC's existence—I can assure you that there has never been a more propitious time in the Command for new solutions to the age old problem of needless self-destruction of our people and our equipment. We have always held our people to be of inestimable value—now our equipment is too. There are hopes for the new systems in the future, to be sure—but no new systems are yet in production. "What you see is what you've got." Let's take care of it—and of each other. If you have ideas on safer ways of operating, let's hear them now. We can **do** "more with less," but we have got to "do something about it . . . it won't just happen." ★★★★



The Best Fit Line

CAPTAIN DAVID C. DAVIS
4017th CCTS

"Pilot, peak is at 6 miles (RN) . . . Six miles-600 ft."

"I've got it radar. Five miles-800 ft. Four miles 800 ft. Three miles-700 ft. Two miles-1,000 ft. Standby crossover-850 ft.

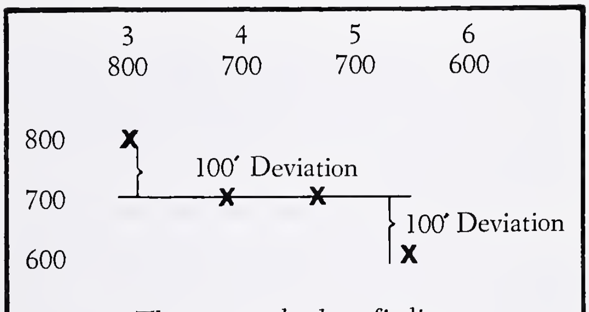
The pilot has done his part and now the TA calibration is all yours nav. Get those X's and O's on the SAC Form 449 and plot that *best fit* line so we can get down to some serious TA flying. Now how do you pilot a best fit line? Don't worry about it, just get close. Your eyeball is good enough and with all that turbulence you can't be too accurate anyway. Besides, the pilot never uses the clearance plane setting you compute anyway.

Does any of this sound familiar to you? It sure does to me, since I used all these "arguments" in the past. A recent CEVG news letter mentioned that navigators throughout SAC are having trouble correctly plotting the *best fit* line on the 449. Maybe I'm not the only one who has been educated incorrectly.

Believe it or not there is a correct method to figure the *best fit* line. First a definition: A *best fit* straight line which has the least total deviation from all plotted points. That is straigrt from the Dash One. But what the book says and what I understand may be two different things.

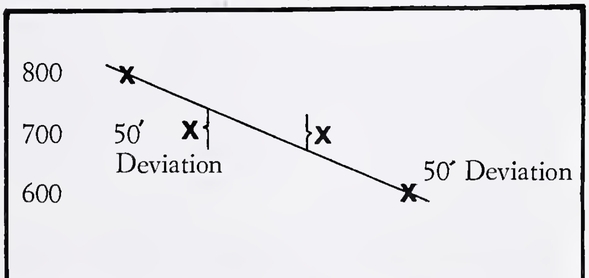
What the definition says can be easily shown in the following diagram:

example A



This is *not* the best fit line.

example B



This *is* the best fit line.

(Continued on page 24)

It was once said that the answer to a safety officer's dream is a dynamic individual who is ready and willing to travel great distances and spend a lot of time in order to make his contribution to our survival.

One Brigadier General, William W. Spruance, is this type. Over the past 12 years, he has logged many hours covering a good part of this globe to give his pitch to anyone who is willing to listen. Those of us who had the opportunity to attend the SAC Safety Seminar at Carswell were fortunate enough to hear General Spruance present a vivid description of his survival after a near fatal crash of his T-33. General Spruance was a guest speaker at the SAC Safety Seminar, and spoke to over 170 seminar attendees. The standing ovation that he received after his presentation attested to the unusual way that he described his experience.

General Spruance graduated from Princeton ROTC and was commissioned in Field Artillery in 1939, entering active duty in 1940. He pioneered light plane use with General Patton's 2d Armored Division, and later transferred to the Air Corps. He served in the China-Burma-India theater flying the "hump" and was released from active duty February 1946. An original member of the Delaware Air National Guard when organized in Septermber 1946, he served in various assignments until appointed Brigadier General, Assistant Adjutant General for Air. He has been awarded the Distinguished Service Medal, the Distinguished Flying Cross and one oak leaf cluster, the Air Medal with the three oak leaf clusters, the Conspicuous Service Cross of Delaware, and a Command Pilot rating with over 4000 hours.

After his near fatal jet crash in 1961 resulting in extensive burns, he has been performing normal Air National Guard duties under a waiver plus extensive additional voluntary duty. Since 1963 he has given over 750 lectures on Crash Survival and Flying Safety to more than 70,000 pilots and military personnel. He has made four training films, many audio tapes, and written several articles on egress. In over a quarter million miles of travel, largely at his own expense, he has made three trips to Southeast Asia. On his last trip to SEA, he gave 100 lectures to over 10,000 servicemen including USAF, Army helicopter and Navy carrier pilots. He has innumerable testimonies from crewmembers who

THE WILL TO LIVE

claim their lives were saved by practicing his egress techniques.

General Spruance is a member of the Executive Council of the National Guard Association, a permanent director of the Air Force Association, the Aerospace Education Foundation, and Chairman of the Board of Trustees of Embry-Riddle Aeronautical University in Daytona Beach, Florida. He is also a life member of the order of Daedalians, the American Ordnance Association, the American Fighter Pilots Association, the Air Force Historical Society, and the Order of Quiet Birdmen.

The following account is part of his story as it was told at the SAC Safety Seminar:

The purpose of my standing here today is to tell you about my experiences in a near fatal crash in a T-33 when returning from Colorado Springs. If you are interested in a few clues on how to outwit the Grim Reaper, pay attention—but if not, and you don't give a damn, just go to sleep and you can stay out of the office for about an hour or so. I will try not to disturb you by talking too loud.

Well, I was with Snapper McCallister in a T-bird in the Springs for a business meeting. Col Mac was flying the aircraft—I'm not a T-bird pilot. I'm a 4-engine jock. I figured that when I started flying the Gooney Bird that I was taking a maximum risk going from four engines to two and I wasn't about to go back to one, so I let him drive the machine.

At the time we had a fighter outfit and I was the Chief of Staff and Adjutant General for Air. I figured that I should know what makes fighter pilots tick. A lot of it rubbed off on me from McCallister and I sorta have an idea on how those people operate. Mac was a pretty darn smart pilot—one of the dive and zoom types that made the change to the all-weather professional which you guys are today. If I had my life to live over, I would certainly have selected him as a pilot to go any place at any time.

Back to the flight. We were scheduled to get off the ground fairly early for our return to Delaware by way of Scott. It was one of those days in which we should have stayed in bed. Mac was late getting out to the field with some excuse about running out of gas. I was careful not to chew him out because I am not one of *these generals who believes in going around raising hell with an airplane driver. You get them shook up, they're apt to kill you if you don't watch it. So I'm real friendly with them and wait to chew them out after we get home.*

We got off late and lept out of Peterson for Scott. We got the flaps up, and fuel started streaming out of the right main wing tank. We aborted, came back to Pete, and had a little discussion with the transient alert types.

They topped us off and back in the air we go for Scott. We arrived without incident except by now it was a dark, hot, muggy night. Those of you who have spent any time in the St. Louis area in midsummer know how miserable it could be. Well, I took my jacket off before takeoff on the next leg. This is where I made my first mistake. I was hot and sweating and didn't want to catch cold when I got to altitude. If I had kept the jacket on, it would have provided insulation from the fire that I was to be caught in, in a few minutes. It would have greatly minimized the burns on my arm—so that was my first mistake.

We started taxiing out, and of course went through the regular procedures on the checklist. Now, when I'm riding shotgun in a T-33, the seat belt and shoulder harness check means more than just strapped in. I always make sure I don't have anything that will prevent me from putting my feet up on the instrument panel (and I do this in an automobile also) to make sure I can brace myself for an impact. With your legs up on the panel, you make a natural G-suit that will help you stay in one piece on a sudden deceleration. Then I stretch and make sure that my hands can reach the panel so that I can brace myself with them. And finally, during this check, I put my head back hard against the headrest. I found out later that this was to be my second mistake. If you are going to impact you should put your head forward with your arms and legs out against the instrument panel. Because if your head is back, you are going to get a whiplash. This may result in a spine injury or, as in my case, it tore my helmet off my head. This procedure I've just talked about was a little exercise I used to go through prior to each takeoff. Now, it is hard for me to get into a mental attitude to think that something is going to go wrong. I think this is one of the hardest things for anyone who really loves to fly to do. One way to help you make this mental adjustment is to read some of these horror publications, i.e., some of these flying safety magazines. You really have got to think about the possibility of pranging some time and get prepared for it. Believe me, it sure pays off.

Of course we checked pins, lanyard and canopy. I rechecked my chin strap tight, and since I wasn't going to make the takeoff, ran the seat all the way to the bottom. I always figured if we were to flip over for some reason, I didn't want my head sticking up there like a goose and get smashed in. My last check was my gloves all the way up, and we took the runway.

Down the runway we went and off into the black night. About the time we got the gear up and the flaps were coming up, the engine quit. No snap, no crackle, no pop, no nothing. It just completely unwound to zero. Mac comes over the interphone and says, "Boy, we're in a

hulluva fix, we've got to get out of this." This did not mean to me to eject. We had covered the procedures and terminology that we would use in the event of an ejection and this wasn't it. We were at about 150 feet in the air, going pretty slow, and going downhill. Within seconds we hit the first tree, 110 feet above the ground. I had a chance to go through my procedures again of checking the chin strap, visor down, seat belt and shoulder harness as tight as possible and real uncomfortable.

I braced myself as soon as I heard the first "whap" on the bottom of the fuselage. The next thing that happened was everything went red. At first I thought of fire. Later I found out it was nothing but a red out when my head was snapped forward. There was a deceleration force estimated between 9 and 13 Gs. My helmet went right off my head in spite of the fact that it was well adjusted and on tight. The plexiglas of the canopy just fractured and came completely out of the frame and my helmet was actually outside of the cockpit. The seat belt and shoulder harness kept me tight in the seat. If you guys don't use the seat belts in your cars, there isn't much I can say for you. Anybody who doesn't have a seat belt and doesn't wear it all the time, in my estimation is an idiot. When I get in a car that doesn't have a seat belt, I sit behind the driver. When the guy says, "What are you doing back there" I say, "When you go through the windshield, I want you to make a good clean hole so that when I go through, I won't get cut." Why if my kids get in the car with the door shut and no seat belts on, it costs them a buck. Not tomorrow, but right now. They either get out of the car and get a buck or they have to work it off. I charge them a buck on the spot and it really pays off.

Back to the augur. Just before I lost my sight because of the red out, I looked at the instrument panel and saw 125 knots on the airspeed indicator. All became red and I passed out. When I started to come to, the first sensation I had was the feeling of warmth. I felt like everything was great—a sense of well-being. It was the kind of sensation that you get in the altitude chamber when you take your mask off. That's the feeling I had, and from my chamber training, this was a danger sign that something was wrong. The next thing I thought of was I had to get out of here, or I wouldn't get back to any cocktail hours with my wife and kids. When I was in General Patton's Second Armored Division early in the war, one of the things that he trained us to do was that when you are in a bind or any kind of shock situation, do something—even though it may be wrong. The chances of your doing something wrong and having it actually hurt you are a helluva lot less than the chances are if you just sit there, freeze in terror, and just do nothing.

So I was motivated to do something right away. I was trained to be able to react automatically, because I had gone over in my mind many times what needed to be done in any situation. In spite of the fact that when I woke up with this warm sensation, and completely on fire (there was a mass of flames all around me and I could hear my hair burning on my head just like a crackling grass fire—looking down both sides of the cockpit was like looking into two afterburners), I reached down to *put the pins in the seat. About then my logic takes over and says, Jeez, what the blazes am I doing fooling with these things when those dynamite caps are going to cook off and launch me into the boondocks within seconds. I started to undo my seat belt and my hands were so badly burned that I permanently injured my little finger trying to take hold of the metal. But still according to standard procedure, though I was burning like a torch, I was just as careful as I could be about getting out of the seat without those pins in place. And I remember taking the chute with me so that I could use the canopy to wrap up in and put the fire out.*

So I get up with the chute hanging on to me and I looked around. On the left side I could see nothing but a mass of flames, the front and the cockpit were full of fire and I could see McCallister doubled up and completely flat with his head down in the bottom of the cockpit. There was no motion from him. (Later I learned that he had been killed on impact.) Over on the right side I saw a creek and that the water was carrying the fuel off downstream. I turned around and sat on the edge of the canopy rail and this was my first sensation of pain. It was so hot that I got a first degree burn on my tail. I rolled over and sorta half dove and half fell into the water—(you just don't execute any point winning half-gainer with a parachute on and you are on fire.) I hit the water and went to the bottom like a rock (we were in about six feet of water). The next sensation was pain. I reached up and could feel a fair sized hole in the back of my head where it had struck the seat's headrest on the rebound. I came to the surface and began wallowing around doing the butterfly breast stroke to keep the burning fuel on top of the water away from me. Down to the bottom again. I discovered since I didn't have adequate religious connections to walk on top of the water, the next best thing was to walk on the bottom and go uphill. That's the technique I used in this instance and made my way up on the bank.

There I started to pull the "T" handle on the chute to dump the canopy. That's the sorriest rig I've ever seen. I didn't have enough strength or mobility left in my fingers to get hold and pull it. The old "D" ring would have been no sweat. As it was I wasn't on fire because of that swim I just had, and I really didn't need the chute canopy to roll up in.

While I was yanking at this "T" handle and not able to get it out, a bunch of civilians arrived at the scene. I figured that the aircraft might blow up any minute so I began shouting at them to get away from the fire. That's how they found me. They came over and I asked them to get the chute off me. Just try to explain how to take hold of the catch on the leg strap while in a state of shock. You've got one helluva problem. When the medics arrived, I asked one to cut the harness off me. They finally found my knife, cut the chute off, and got me in the ambulance. I started getting cold so they gave me some shots and I don't remember much of the ride.

Later I found out that on the way to the hospital the chaplain administered the last rites of the Catholic Church. That's probably the reason I survived, because I'm a Presbyterian and the Catholic rites wouldn't take.

But you know, you shouldn't sell those chaplains short. When things were really tough for me down there in the Air Force Hospital (Wilford Hall) at San Antonio, they were really great. I haven't been too much of a churchgoer myself—always been a believer in specialization—and when it comes to praying I like to get a real expert like a chaplain.

There was one chaplain down there at Lackland that I thought was particularly good. He'd been an engineer during the war and he got so sick and tired of building bridges and seeing the enemy blowing them up, he thought he'd get into something a little more permanent like saving souls, so he switched over to the chaplain corps. He had been a sinner before so he and I were really on the same frequency and able to communicate. Anytime we had any rough operations or anything like that, the chaplain would get in there kinda like a coach on a football team. He would get all the surgeons and nurses around and really was a great help to everyone concerned.

Over the next two years I went through over 30 surgery procedures to get me patched up. I'm still not A Number One, but I'm good enough to get my FAA private pilot's ticket. There are many things that have enabled me to be in the relatively good shape that I'm in today. Gloves. I had my gloves on during the crash. Anyone who flies around without gloves in my estimation is another plain idiot. Any of those old wives tales that they give you about gloves getting soaked with kerosene, crinkled up and are no good, is nonsense. Mine had just about as much JP-4 as yours. If I hadn't had those gloves on, I would be a doubled arm amputee, that is, if I had survived at all. So it really behooves you to wear those things. Now the reason why I wore gloves was that one time down in Savannah our outfit was flying F-86s. One of our young second johns taxied down the ramp, middle of summer and hotter than the hinges of hell, with his sleeves rolled up, elbows on the canopy rail, and no gloves. General Milliken remarks to me, "Well, I don't usually beef at other people's troops, but this guy needs to learn." So this second john gets out of the cockpit and the General approaches him with a story about when he was in the RAF. He related that when they brought back the first casualties of the Battle of Britain, they showed the stumps of the arms of guys who had been burned and were not wearing gloves. They showed the legs and stumps of those who had not been wearing boots. From then on he started wearing gloves and expected everyone else to do so.

I was so impressed by this that I started wearing gloves. I hadn't worn gloves all through WWII. I figured gloves were for the wintertime to keep hands warm. I started wearing gloves because of what General Milliken said to this second balloon. This points out the importance of all of us making sure everyone uses his personal equipment and not be afraid to sound off when we see something amiss.

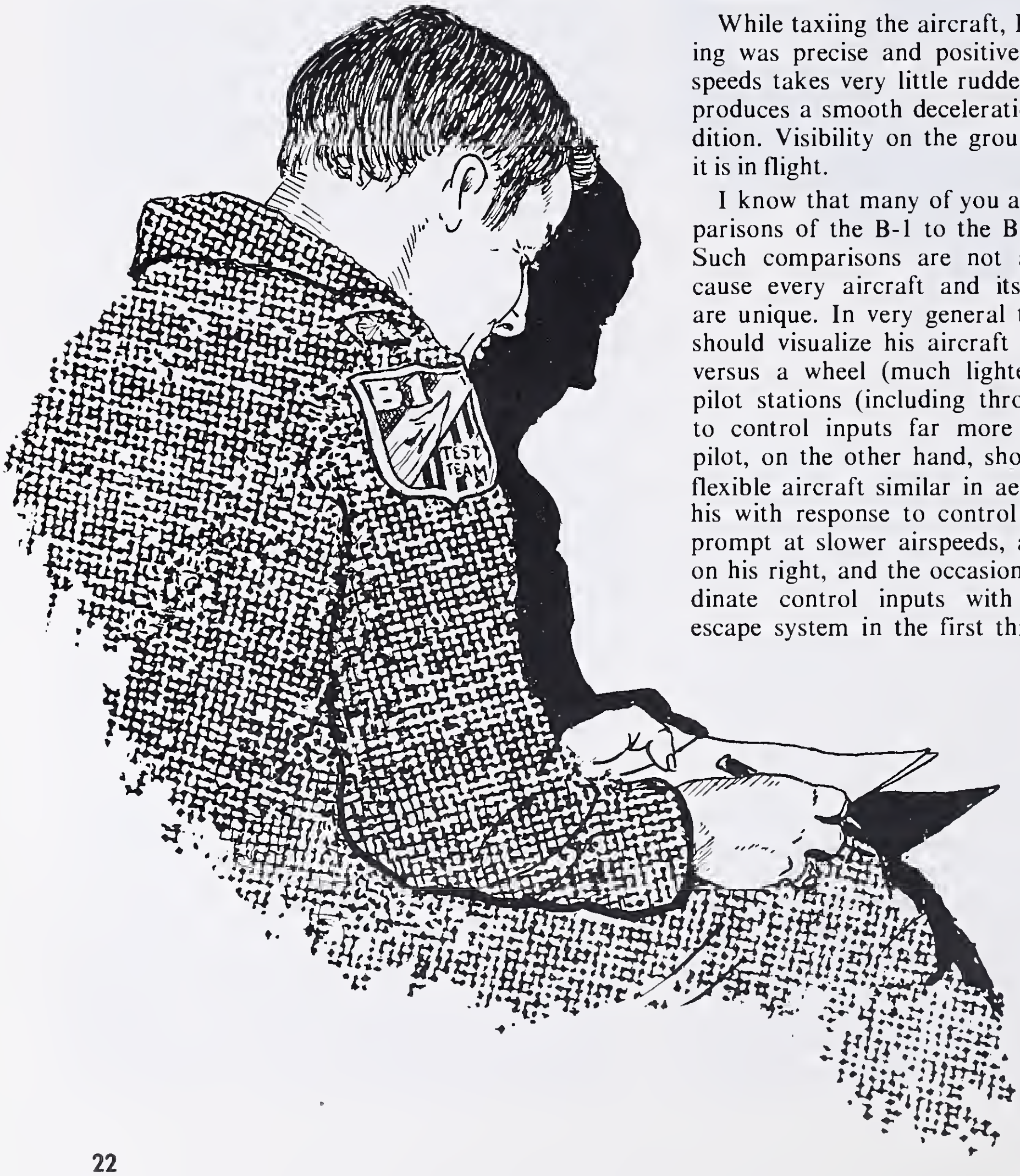
Next is boots. If I had low cuts instead of boots, I would be a double leg amputee. Low cuts in a bailout or any kind of fire situation are a complete waste of time. I had my boots on, and thank God I did. I would have burned off both my legs if it weren't for them.

Finally, I can't say enough for the treatment the Air Force gives at their hospital in San Antonio and the help from the Army Burn Center. There they have, without doubt, the greatest concentration of knowledge on burns in the whole world. They were able to save my arms and hands after many experts said it couldn't be done. The Kennedys, duPonts or Gettys can't get better service than that is available to us in the Air Force. In my book they will always be A Number One.

Then there is always the will to live. When things look real dark, it's real easy to throw in the towel and call it quits. But the human body is a remarkable thing that can come back from over the brink and recover. It can and will, if you have the proper mental attitude and the guts to stick it out. The doctors, chaplains, and our medical technologies can perform miracles if you let them. In the final analysis, it's up to you—what you wear, and how well you are prepared.

ment of the horizontal stabilizers.

Aerial refueling was a "piece of cake." Only very small throttle and flight control movements were required to maintain a stabilized refueling position. I flew the aircraft while taking on 60,000 pounds of the 90,000 pound offload without a disconnect and within a reduced flight test boom envelope. Of course, part of the credit belongs to the skilled SAC tanker boom operator who kept me out of trouble. It has to be a good aircraft and flight control combination to allow a new guy to accomplish a refueling task like this on the first attempt. Visibility during refueling is a bomber pilot's dream. Since the cockpit area of the B-1 is about one-third glass, there is no more slouching down in the seat or bending of the B-1 pilot since the air refueling receptacle is mounted forward of the wind screen. I know that there will be some of us, as I did in the B-47, who will initially attempt to fly the boom. All I can recommend is don't do it. While the boom is an excellent secondary visual reference, you cannot fly formation with it and remain in contact.



For the descent from cruise altitude to the traffic pattern, four of the eight spoiler segments were used as speed brakes. Extension of the speed brakes causes a pitchup and requires retrimming the aircraft. Of course, the opposite is true when the speed brakes are retracted. In configuring for the approach phase, lowering the flaps also requires a trim change, as on other conventional aircraft.

The B-1 is easily maneuvered in the traffic pattern. I made two low approaches from go-arounds using an extended 360° overhead type pattern with no difficulty. While I did not make the landing, my observation was that it required no more than a smooth small aft stick displacement to command the transition through flare to touchdown.

While taxiing the aircraft, I observed that steering was precise and positive. Braking from taxi speeds takes very little rudder pedal pressure and produces a smooth deceleration to a stopped condition. Visibility on the ground is as excellent as it is in flight.

I know that many of you are interested in comparisons of the B-1 to the B-52 and the FB-111. Such comparisons are not always accurate because every aircraft and its associated systems are unique. In very general terms the B-52 pilot should visualize his aircraft with a control stick versus a wheel (much lighter forces), duplicate pilot stations (including throttles), and response to control inputs far more rapid. The FB-111 pilot, on the other hand, should visualize a large flexible aircraft similar in aerodynamic design to his with response to control inputs not quite as prompt at slower airspeeds, another pilot always on his right, and the occasional necessity to coordinate control inputs with rudder. The crew escape system in the first three aircraft employs an escape module concept similar to the FB-111. However, the decision has been made to return to ejection seats for the production aircraft.

Before continuing, it is important that you understand that the SAC crew members involved with this program are conducting an operational evaluation for the Air Force Test and Evaluation Center (AFTEC) during the initial development and test of a prototype aircraft. This means that SAC personnel are for the first time in a major test program obtaining a sneak preview and influencing design in the initial development and implementation of a weapon system. It also means that operational evaluation and testing will be conducted during the various phases of the developmental test program of the B-1. For example, after portions of the initial flight envelope were flight tested, operational pilot handling and flying qualities evaluations were made. Additional evaluations and operational test flights will be made by SAC/AFTEC crew members after installation of the automatic flight control system, the terrain following system, and the offensive avionics system to name a few.

There will be many more flights for the SAC/AFTEC personnel on board with the test force here at Edwards. There have been and there will be deficiencies discovered with the B-1 aircraft and its subsystems, but that is exactly why a developmental test program is conducted. SAC's participation in this program through AFTEC was directed by the Department of Defense, specifically to identify those deficiencies as they pertain to the operational mission of the B-1. Hopefully, when the B-1 reaches the hands of many of you, it will be a weapons system that you can effectively operate in the field without an extensive modification program being required to render the aircraft suitable.

One of our primary goals is to provide you, the future B-1 crew members, with a weapons system that you will walk away from after your initial and subsequent flights with as favorable an impression as I have experienced. In that light, we of SAC's 4200th Test and Evaluation Squadron at Edwards AFB CA, would welcome any constructive comments addressing your operational concerns relative to the SAC mission of the B-1. As we do have the benefit of recent SAC operational experience among our operators, we are not always immediately aware of the continuing changes in the field.

In reading this article, you will see it was obvious that I was favorably impressed by my first B-1 flight. I hope that the same chance will be offered to many of you, in the not too distant future. To be a crew member on the B-1 . . . all I can recommend is "PLAN TO BE ONE," you'll like it.

About The Author

Major Larson, the B-1 Operations Aerospace Research Flight Test Officer for the Strategic Air Command at Edwards AFB, was commissioned from the United States Air Force Academy in 1962. His initial operational flying assignment was with SAC and the 9th Strategic Air Wing as a B-47 pilot. During this time he held positions as senior standardization-evaluation copilot and aircraft commander. He was involved in certification of B-47 nuclear and conventional weapons capability. Upon deactivation of the B-47, in 1966, Major Larson was assigned as an aircraft commander in E/R B-66 aircraft. After training in the EB-66 he was assigned to the 41 Tactical Reconnaissance Wing (PACAF) based at Tahkli Royal Thai AFB, Thailand. During this tour in Thailand Major Larson flew 85 combat missions in North Vietnam. In 1967 he was selected to attend the Air Force Test Pilot School at Edwards AFB. Following graduation he was assigned to the Bomber/Transport Branch of Flight Test Operations (AFSC) at Edwards. During this assignment, he was instrumental in the completion of test programs such as B-52 G/H powered flight control system, C-119 U/G performance testing, B-66 AIMS program, FB-111 Category II test program, advance tanker refueling investigations, and aircraft arresting barrier certifications. In August, 1972, he was assigned to Strategic Air Command (4200 Test and Evaluation Squadron), Edwards AFB, as the pilot representing SAC in Initial Operational Test Evaluation of the B-1 weapons system.

BEST FIT LINE . . .

(Continued from page 15)

Deviation from the line is always measured vertically from the *best fit* line (not perpendicular to the line) and should be equal both above and below the line. Example A has equal deviation above and below the line, but by comparison, the deviation is greater than that resulting from the correct best fit line in Example B.

Now that you understand the definition, let's draw that line. Going back to our TA Cal Check we had fade points of 6 miles-600 ft, 5 miles-800 ft, 4 miles-800 ft, and 3 miles-700 ft. Plotting the X's on the form is the easy part. Now for the first step that most of you eyeball *best fit* line drawers may have never used. Add up all the fade point values and divide by the total number of fade points. This mathematical average will be plotted at the midpoint of the fade points used. It will also be a point on the *best fit* line. Again in our example: 600 + 800 + 800 + 700 = 2900. Dividing 2900 by 4 =725. So on the 449 plot at 725 ft at 4½ NM. If you had only three minimum fade points, you plot at the midpoint of the three points. Once more, fade points 4,5,6—plot at five miles.

Once you have the mathematics done the rest is easy. First I will explain the guide inflight method of correctly plotting the *best fit* line and then cover the more technical way. There are two characteristics of a *best fit* line that it pays you to know. One—the line will always pass through the mathematical midpoint. Two—the line will *always* be parallel to a line drawn between the two extreme fade points. Again in our example, a line drawn between the three and six mile fade points. So to quickly draw the line, figure the mathematical midpoint, 725 ft at 4½ NM, plot it, lay your plotter down between the three to six mile fade points and move it up to pass through 725. Now draw that line. Quick, easy and accurate.

Now for those of you who are harder to convince. Again plot the mathematical midpoint. Take the six mile (or highest mileage fade point) and draw a line from it through the midpoint to clear plane zero (CPO). Next draw a line from the midpoint through the three mile fade point (or least mileage fade point) to CPO. In our TA check the midpoint/six mile line will cross CPO at 1100 ft. The midpoint/three mile line will cross CPO at 650′ and the average of the two is 875. The average of these two lines is the CPO for the *best fit* line. The *best fit* line runs from this CPO point, through the mathematical midpoint. If you try this longer method you will find it plots out exactly like the quicker inflight method.

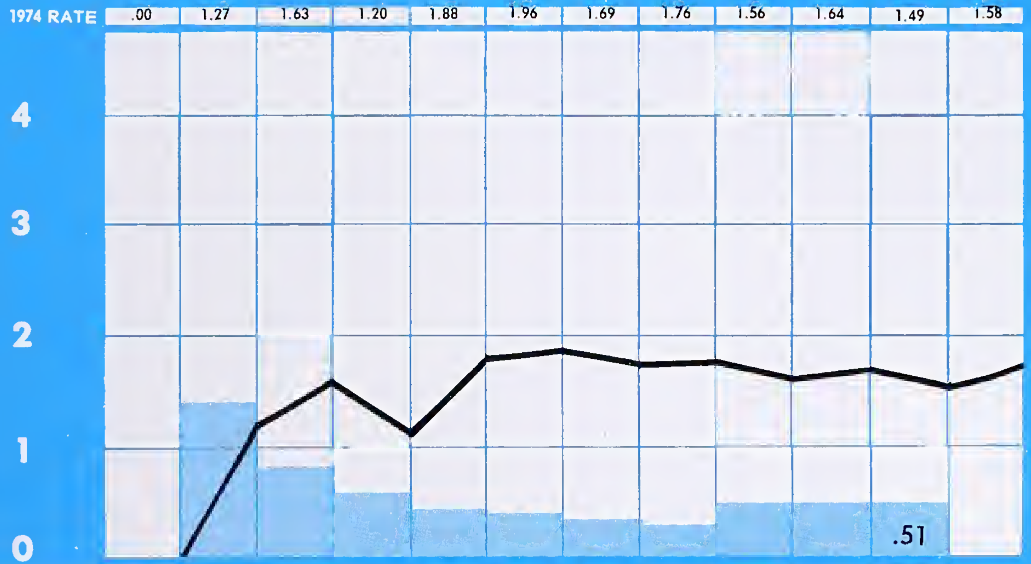
The Dash One has a statement that says you do not need to compute the line; ". . . . it can be established with acceptable accuracy by estimation". But when you get that weird series of fade points, or it is standboard time, or when you are getting that TA set refined for the ORI or Buy None, then you might want to know how to figure the tilt and bias errors correctly. Next time you have a TA class or a flight try this method. It is being taught at Castle so you old timers might want to catch up with the young blood coming into the Command.

About the Author

Captain David C. Davis is a graduate of Texas A and M. He has accumulated 4200 hours of flying experience and has served as an instructor radar navigator in the C,D,F,G and H model B-52. He has 225 SEA combat missions to his credit including 40 over North Vietnam. He also served as an instructor at the Strategic Air Command's B-52 Replace Training Unit, the 7th Bomb Wing D model CCTS as an instructor and flight evaluator, the 328th Bomb Squadron as a flightline instructor and is presently serving as an academic instructor with the 4017th Combat Crew Training Squadron.

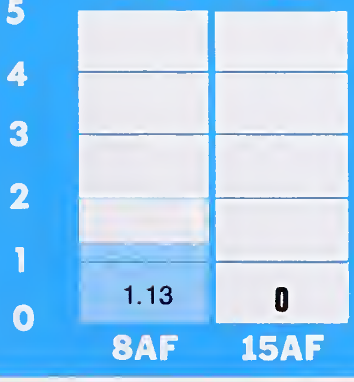
1975 Flying Safety Rate

★ SAC MAJOR ACCIDENT RATE (PER 100,000 FLYING HRS)



ACCIDENTS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1974	0	1	1	0	2	1	0	1	0	1	0	1
1975	0	1	0	0	0	0	0	0	1	0	0	

1975 SUBORDINATE CMD RATES



ACCIDENT STATUS

FB-111	FEB 75
B-52G	SEP 75
KC-135	DEC 75
FB-111	DEC 75

LEGEND — =1974 RATE

PROFESSIONAL PERFORMERS

Individuals selected for these pages as SAC's top professional performers of the month are chosen from nominations made by all SAC units. Selection is made only after all nominations have been carefully screened and those chosen meet the highest standards of excellence as outlined in SACR 127-2.

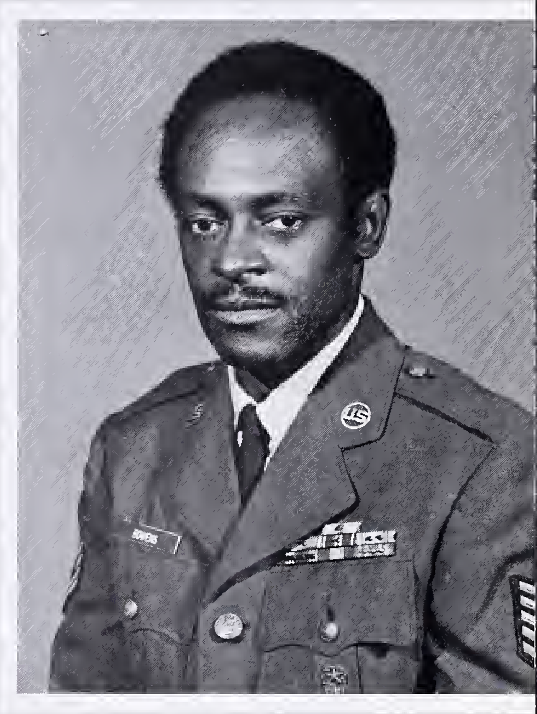
Crew R-10 (standing L to R) Captain Butch Sloan, pilot; Captain Gary Schoenike, navigator; 1Lt Bradley Lake, EWO; (kneeling L to R) MSgt John Crow, gunner; 1Lt Terry Tooley, radar navigator; and Captain Larry Lopez, copilot.

FLYING CREW

Crew R-10, of the 410 Bomb Wing, departed K. I. Sawyer for a routine training mission. Four and one-half hours after takeoff, the overheat light for No. 7 engine generator illuminated. Dash-1 procedures were implemented and the generator was decoupled causing the light to extinguish. Approximately one hour later, while the crew was flying a low level route, the overheat light illuminated again. Number 7 engine was shut down in accordance with Dash-1 procedures, the low level route was aborted, and the crew returned to the K. I. Sawyer local area. During the penetration, the left aft landing gear failed to extend. Dash-1 emergency procedures were accomplished with no success. Communications were established with local supervisors, Hq 8AF, and Boeing Company advisors. Various emergency procedures and techniques were attempted without success. Following these unsuccessful attempts to extend the left aft gear, the aircraft remained airborne until the gross weight was reduced to approximately 206,000 pounds. Captain Sloan, the aircraft commander, then made a perfect engine-out, three-gear landing and stopped on the runway with no damage to the aircraft or injuries to the crew. Crew R-10's calm evaluation of multiple aircraft emergencies, effective coordination and excellent aircrew technique resulted in the safe recovery of a valuable aircraft and combat crew.

PROFESSIONAL PERFORMERS

TITAN Crew E-091, 390 SMW, Davis-Monthan AFB: MCCC 1Lt William T. Harrison, DMCCC 2Lt Gill S. Paszek, MSAT Sgt Madison Smith III, MFT A1C Robert R. Johnson.



MAINTENANCE MAN TSgt Paul D. Bowens, 321 Missile Maintenance Squadron, 321 SMW, Grand Forks AFB, is SAC Maintenance Man of the Month.

MINUTEMAN Crew R-122, 351 SMW, Whiteman AFB: MCCC 1Lt Allen G. Kliebert, Jr., DMCCC 2Lt Bura R. Hewitt.

WHAT IF . . .

These are the words of a walking, live F-100 pilot who survived a low altitude ejection:

"I can remember raising the handle and the cockpit filling up with smoke, but from that point on until getting up from the ground, I have no memory of the events of the ejection. It is obvious to the egress people investigating the accident that the entire sequence of events occurred perfectly with the chute opening so close to the ground that no witnesses actually saw the chute. My estimation is that the chute opened approximately 200 feet above the ground or less. . .

"I feel that the ejection system worked flawlessly and, in fact, I owe my life to the engineering that went into this system."

For most crewmembers who have survived serious aircraft accidents, well engineered life support systems have been the primary factor in the crewmember's survival. From January to July 1975, the Air Force ejection success rate has been 85%—30 successes out of 35 attempts.

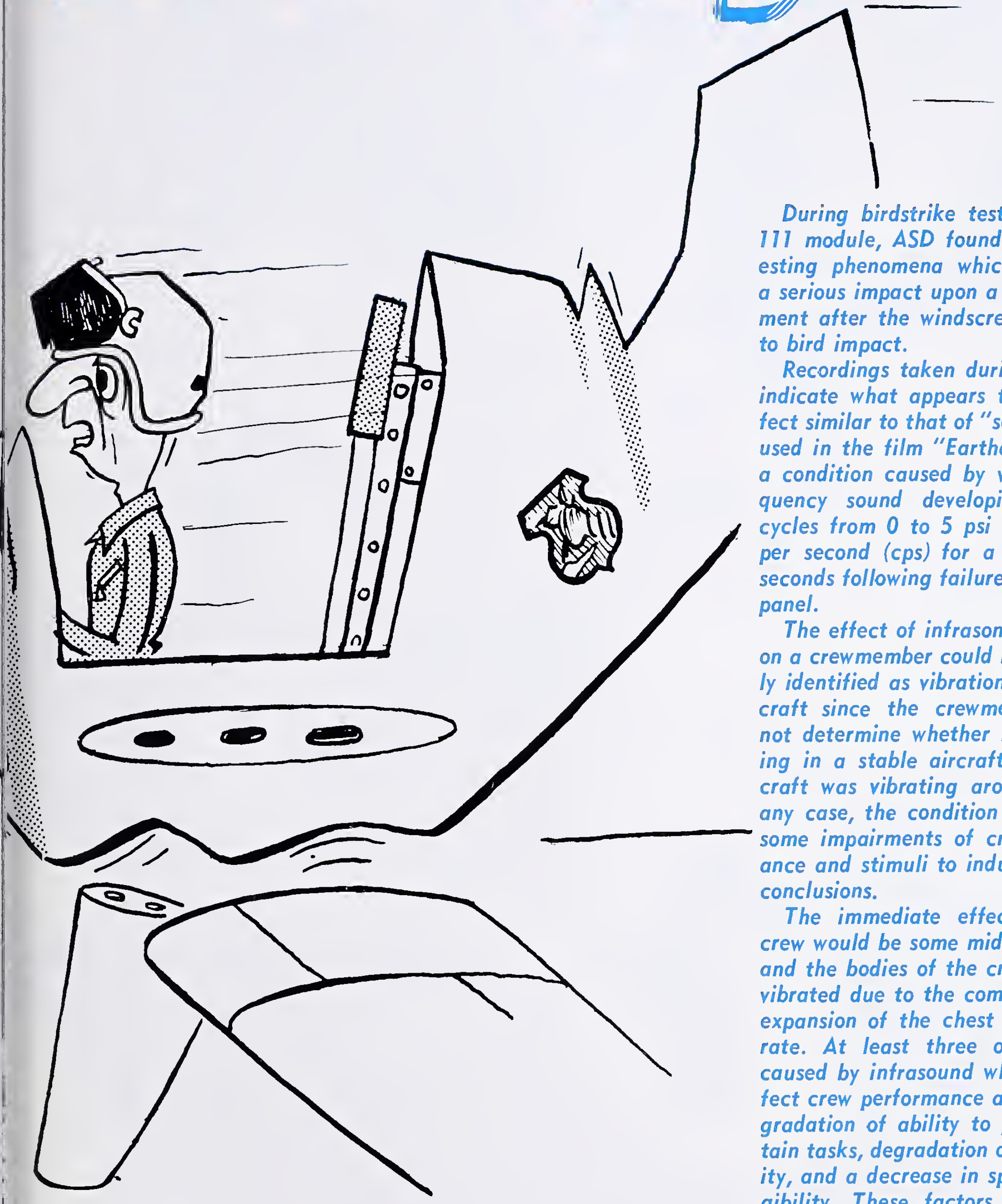
What if everything didn't work flawlessly? The F-100 pilot may have ended up in the minority group. It is obvious that he's a firm believer in checking, rigging, adjusting, preflighting, and understanding every piece of his life support equipment. What if he weren't? What if some malfunction occurred during the ejection? Could he have survived?

This man shaped his own destiny and did survive. Certainly the safety record of SAC's fleet compared to the F-100 puts the B-52, KC-135, and FB-111 in a more trustworthy status, but SAC's safety record is not perfect. Accidents requiring bailout do occur, although not frequently. When they do occur, the need to egress is usually spontaneous and immediate. There may be no time to recheck, adjust or put on what is laying next to you.

There is another key to the success of those who survived. That is preparation. Although the thought of ejecting is not particularly a popular one, thinking through the procedures more often than once a year during LST may make them more automatic when the time comes. Understanding how the system works could mean the difference between success and failure in the event of a malfunction.

What if the seat doesn't fire.. What if the separator doesn't work properly? What if the parachute has to be activated manually.. What if . . . !

HAZARDS



BIRDS AND AARDVARKS

During birdstrike tests on the F-111 module, ASD found some interesting phenomena which may have a serious impact upon a crew's judgment after the windscreen fails due to bird impact.

Recordings taken during the tests indicate what appears to be an effect similar to that of "sensorisound" used in the film "Earthquake." It is a condition caused by very low frequency sound developing pressure cycles from 0 to 5 psi at 20 cycles per second (cps) for a period of 5 seconds following failure of the glass panel.

The effect of infrasonic waves upon a crewmember could be mistakenly identified as vibrations in the aircraft since the crewmember could not determine whether he was moving in a stable aircraft or the aircraft was vibrating around him. In any case, the condition could cause some impairments of crew performance and stimuli to induce incorrect conclusions.

The immediate effect upon the crew would be some middle ear pain, and the bodies of the crew would be vibrated due to the compression and expansion of the chest at a 20 cps rate. At least three other effects caused by infrasound which may affect crew performance are: some degradation of ability to perform certain tasks, degradation of visual acuity, and a decrease in speech intelligibility. These factors may be insignificant in light of the greater problems caused by cockpit debris and wind noise.

The new art editor for Combat Crew, A1C Gerald F. Moriarty, and the staff wish to say goodbye and thanks to SSgt Wayne Sealy. SSgt Sealy has for four years provided many illustrations and cartoons for this magazine. His wit and ability will be missed. The staff wishes him well on his new assignment.

SAC Safety Screen

The SAC Safety Screen is an honor roll of SAC's most professional crews. To gain listing on the Screen, crew members must be nominated by their unit commanders and meet high selection criteria of experience in their aircraft or missile system *IAW SACR 127-2.*

11 AREFS, Altus Crew E-121: P Capt David D Bentley, CP 1Lt Norman N Crapster, IN Capt John K Wilson III, BO SSgt John P Huggins

449 BMW, Kincheloe Crew R-116: AC Capt Larry K Hansen, CP 2Lt H Steve Edge, NN 1Lt Terry L Wilson, BO A1C Randall D Hulet

7 BMW, Carswell Crew E-19: AC Capt Bryan F Carpenter, CP 1Lt Benjamin W Jubela, RN Capt William R Poff, N 1Lt John J Corradetti Jr, EWO 1Lt Michael M Essmyer, G SSgt Tommy R Lowe

2 BMW, Barksdale Crew S-151: AC Capt Earl J Guidry Jr, CP 1Lt Larry D Morelock, NN Capt Michael F Seymour, BO TSgt Harold G Rush

909 AREFS Kadena Crew R-116: P Capt Cecil M Bateman, CP 2Lt Joseph H Ferry, N 1Lt Roger M Shweid, BO TSgt Donald B Burton

28 BMW, Ellsworth Crew S-103: P Capt Howard J Kidder, CP Capt Robert G Cole, NN 1Lt Richard C Archibald, BO TSgt Lamoyne W Darnall

100 SRW, Davis-Monthan Crew E-64: P Capt Steven C Elsasser, CP Capt Norman C McCaslin, NN Maj James P Rioux Jr, ARCO Maj Roland M Valentine, LCO Maj Lee J Holbert, LCO Capt Lawrence B Wallace, ART SMSgt Sanford L Hodges, FE SMSgt William M Peterson

319 BMW, Grand Forks Crew E-127:P Capt Myron A Sommervold, CP 1Lt Dennis R Clark, NN 1Lt Robert F Agnew, BO SSgt Robert E Ferguson

320 BMW, Mather Crew E-15: P Capt Gregory D Coffey, CP Capt Cloyce W Scheer, CP 1Lt Wesley Collins, RN 1Lt Michael R Forbes, NN 1Lt Curtis D Wiley, EW 1Lt Randolph R Rihner, AG SSgt Ray T Zamora

93 BMW, Castle Crew IT-08: P Capt Barry C Bradford, IN Maj Orrin J Olsen, IS MSgt Danley E Hanes

17 BMW, Beale Crew E-09: P Capt Thomas G Hakeman, CP 1Lt Kenneth S Kapka, CP Capt Arthur E Fournier Jr, RN 1Lt George N Nazarko, NN 1Lt Lendon J Smith Jr, EW 1 Lt Donald F Hanson, AG Sgt Norman K Holbrook

90 SMW, F E Warren Crew R-133: MCCC 1Lt Stanley D Bailey, DMCCC 1Lt Monnie L Gore Jr

91 SMW, Minot Crew E-071: MCCC Capt Curtis A Davis, DMCCC 2Lt Kimball R Krantz

308 SMW, Little Rock Crew E-108: MCCC 1Lt Daniel R Holmes, DMCCC 2Lt Carey Baldwin, MSAT Sgt Jerry C Middleton, MFT Sgt Arthur J Godfrey

341 SMW, Malmstrom Crew R-112: MCCC Capt Gary L Shotwell, DMCCC 2 Lt Todd H Curtis

381 SMW, McConnell Crew R-002: MCCC 1Lt Brian R Barber, DMCCC 2Lt Preston L Cottman, MSAT A1C Donald L Pullara, MFT Sgt Terrence L Holmes

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FLARE

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In the SPIRIT of '76'

AT what point shall we expect the approach of danger? . . . I answer, if it ever reaches us it must spring up amongst us; it cannot come from abroad. If destruction be our lot we must ourselves be its author and finisher. As a nation of freemen we must live through all time, or die by suicide.

I hope I am over wary; but if I am not, there is even now something of ill omen amongst us. I mean the increasing disregard for law which pervades this country—the growing disposition to substitute the wild and furious passions in lieu of the sober judgment of courts. This disposition is awfully fearful in any community; and that it now exists in ours, though grating to our feelings to admit, it would be a violation of truth and an insult to our intelligence to deny.

There are those, having ever regarded the government as their deadliest bane, make a jubilee of the suspension of its operations and pray for nothing so much as its total annihilation. While, on the other hand, good men, men who love tranquility, who desire to abide by the laws and enjoy their benefits, who would gladly spill their blood in the defense of their country, seeing nothing in prospect that forebodes a change for the better, become tired of and disgusted with a government that offers them no protection, and are not much averse to a change in which they imagine they have nothing to lose. Thus, then, by the operation of this mobocratic spirit which all must admit is now abroad in the land, the strongest bulwark of any government, and particularly of those constituted like ours, may effectually be broken down and destroyed—I mean the attachment of the people.

The answer is simple. Let every lover of liberty, every well wisher to his posterity swear by the blood of the Revolution never to violate in the least particular, the laws of the country and never to tolerate their violations by others. Let reverence for the laws be breathed by every American mother to the lisping babe that prattles on her lap; let it be taught in schools, in seminaries, and in colleges; let it be written in primers, spelling bookd, and in almanacs; let it be preached in the pulpit, proclaimed in legislative halls and enforced in courts of justice. And in short, let it become the political religion of the nation; and let the old and the young, the rich and the poor, the great and small of all sexes and tongues and colors and conditions, sacrifice unceasingly upon its altars.

ABE LINCOLN, JAN 27, 1837